

METHODS AND APPARATUS FOR A PUTTER CLUB HEAD

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Field of Invention

[0001] The present invention relates, generally, to golf club heads and, more particularly, to an improved hosel for putter club heads.

Background of the Invention

[0002] Golf club heads are typically customized to accommodate the personal preferences of an individual golfer. Many forms of customization, however, can cause undesirable changes in the geometry and visual cues provided to the golfer by the club head during and after address, thereby impeding the golfer's ability to properly line up the ball with the club head to produce the desired ball path. These changes in visual cues may also have undesirable psychological effects (i.e., with respect to the golfer's address and stroke) that are perhaps not immediately apparent to the golfer.

[0003] In the case of putter club heads, for example, it is possible to adjust the lie angle to suit a golfer's preferences. That is, referring to Fig. 1A, a golf club head 100 may include a club head body 102 having a sole 103, a leg portion or "hosel stem" 104 extending perpendicularly from body 102, and a hosel boss (or simply "boss") 106 configured to accept a shaft 108. Hosel boss 106 and leg portion 104 are referred to in combination as the "hosel."

[0004] A lie angle 120 is formed between shaft axis 105 and body axis 110, which is generally parallel to ground reference 111 at address. In order to increase or decrease lie angle 120 to fit a particular golfer, leg portion 104 is generally deformed with respect to body 102, e.g., by rotating leg portion 104 about a region 130 adjacent body 102. As shown in Fig. 1B, when club head 100 is viewed from a nominal viewpoint angle (i.e., from

substantially above club head 100 at address), leg portion 104 is concealed by boss 106 and/or shaft 108.

[0005] As depicted in Figs. 2A and 2B, when leg portion 104 is rotated by an angle 202 (i.e., by increasing lie angle 120 "upright"), leg portion 104 remains concealed by boss 106. However, as shown in Figs. 3A and 3B, when leg portion 104 is rotated the other direction by any non-zero angle 302 (i.e., by decreasing or "flattening" lie angle 120), a portion 304 of leg portion 104 is revealed to the golfer. The visual appearance of leg portion can be disconcerting to the golfer, and can deleteriously affect the golfer's address and/or subsequent putting stroke.

Summary of the Invention

[0006] A putter club head in accordance with the present invention generally includes a club head body having a leg portion extending from the club head body, wherein the leg portion includes an integral boss configured to accept a shaft along a shaft axis. The leg portion has a predetermined forward slant angle (for example, between about 1.0 - 6.0 degrees) with respect to a body axis, and is suitably configured to deform plastically to allow adjustment of the lie angle such that the leg portion is substantially concealed (e.g., by the hosel boss) when the club head body is viewed from above during address. The leg portion remains substantially concealed within a range of adjustment angles typically used during club fitting, thereby maintaining the club head's desirable visual cues during address. In accordance with an alternate embodiment of the present invention, the leg portion includes a horizontal section providing an offset between the boss and club head.

Brief Description of the Drawings

[0007] The subject invention will hereinafter be described in conjunction with the appended drawing figures, wherein like numerals denote like elements, and:

[0008] FIGS. 1A and 1B are side and top views, respectively, of a putter club head with a vertical leg portion in accordance with the prior art;

[0009] FIGS. 2A and 2B are side and top views, respectively, of the putter club head of FIGS. 1A and 1B subjected to lie angle adjustment;

[0010] FIGS. 3A and 3B are side and top views, respectively, of the putter club head of FIGS. 1A and 1B subjected to lie angle adjustment;

[0011] FIGS. 4A and 4B are side and top views, respectively, of a putter club head in accordance with the present invention; and

[0012] FIGS. 5A and 5B are side and top views, respectively, of a putter club head in accordance with an alternate embodiment of the present invention.

Detailed Description

[0013] A putter club head in accordance with the present invention generally includes a leg portion having a predetermined forward slant angle with respect to the body axis. The leg portion is configured to deform plastically to allow adjustment of the lie angle such that the leg portion is substantially concealed when the club head body is viewed from above the club head during address.

[0014] Referring to Figs. 4A and 4B, a putter club head in accordance with the present invention generally includes a club head body (or simply "body") 102, a hosel leg portion 104, and a boss 106 configured to accept a shaft 108 along a shaft axis 105. Hosel boss 106 and leg portion 104 are referred to in combination as the "hosel." Leg portion 104 is configured with a predetermined forward slant angle 402 such that leg portion 104 is, as shown in FIG. 4B, substantially concealed when the club head is viewed from substantially

above the club head during address. Furthermore, leg portion 104 remains substantially concealed as the leg portion is adjusted to a more "flat" or more "upright" lie angle.

[0015] Club head 400 is described in relation to a reference surface (or simply "reference") 111, which generally corresponds to an idealized surface or "green" upon which a golf ball (not shown) might lie. Body 102 has a body axis 406 which, during nominal address conditions, is substantially parallel to reference 111. Body 102 includes a bottom surface or "sole" 103, which may be planar, but is typically curvilinear and symmetrical about a center point 408. Thus, in the illustrated embodiment, body axis 406 corresponds to the major axis of body 102 and is parallel to both reference 111 (during nominal address conditions) and a surface defined by the tangent at a midpoint 408 of sole 103. Putter club head shapes may vary, however, and do not always conform to such well-behaved geometries. Nevertheless, inasmuch as any reasonable putter club head design will have a nominal address position, body angle, and/or lie angle, the present invention may be used in connection with any known or future club head design.

[0016] Club head 102, hosel leg portion 104, and boss 106 may be manufactured using a variety of suitable materials, including, for example, various metals (e.g., titanium, copper, steel, or the like), ceramics, plastics, or a combination thereof. Furthermore, these components may be integral with body 102 (i.e., formed via casting and/or machining), or produced individually and appropriate joined together.

[0017] As mentioned briefly above, leg portion 104 is suitably configured with a forward slant angle 402 such that, after being deformed plastically within a certain range to accommodate fitting to an individual, leg portion 104 remains substantially concealed such that the golfer, during nominal address conditions, will not be distracted by the appearance of leg portion 104 (as shown in Fig. 4B). In this regard, boss 106 is generally cylindrical and preferably has a diameter that is greater than or equal to the width of leg portion 104. In the

illustrated embodiment, leg portion 104 has a generally rectangular cross-section. The present invention is not so limited, however, and contemplates leg portions with any suitable cross-section, including varying cross-sections.

[0018] The phrase "slant angle" as used herein generally refers to an angle 402 defined by a leading edge 404 of leg portion 104 with respect to a line perpendicular to body axis 406. In the event that leg portion 104 is generally an elongated rectangular prism, as shown, the entire leg portion 104 can be said to have a consistent slant.

[0019] In the illustrated embodiment, as seen in front view Fig. 4A, leading edge 404 has profile defined by a linear segment extending from a point 414 adjacent boss 106 to a point 412 adjacent body 102. As shown in Fig. 4B, the entire length of leading edge 404 is then substantially concealed by boss 106 and/or shaft 108 during setup (i.e., as the golfer is lining up club head 400 with a golf ball while looking directly downward on club head 400). Leg portion 104 is slanted "forward" in that it defines a positive angle 402, such that boss 106 is displaced toward the toe region of body 102.

[0020] While leading edge 404 of leg portion 104 is shown as linear in the illustrated embodiment, the present invention contemplates curvilinear profiles as well (e.g., concave, convex, or other such profiles.) In such cases, the slant angle is conveniently defined in terms of any suitable attribute of leading edge 404, e.g., end points, one or more tangents, or the like.

[0021] As mentioned above, the lie angle of club head 400 may be customized in accordance with the preferences of a particular individual. To accomplish this customization, leg portion 104 is plastically deformed with respect to body 102 such that it effectively rotates with respect to region 130 where leg portion 104 interfaces with body 102. This deformation is typically performed to achieve a target lie angle. When leg portion 104 is rotated to increase lie angle 120, the club head is said to be adjusted "upright," and when leg

portion 104 is rotated to decrease lie angle 102, the club head is said to be adjusted "flat" (or "flattened"). This deformation may be accomplished using a variety of conventional metal-working techniques.

[0022] A forward slant angle 402 allows the lie angle 120 to be adjusted flat while maintaining the desired visual cues of club head 400 by concealing leg portion 104. In this regard, any suitable slant angle 402 may be built in to club head 400, depending upon a variety of design factors, including, for example, the expected range of lie adjustment, the length of shaft 108, the geometry of boss 106 and leg portion 104, and the effective length of leg portion 104 (e.g., from point 414 to point 412). In one embodiment slant angle 402 is between about 1.0 degree and 6.0 degrees, preferably between 1.5 degrees and 2.5 degrees, and most preferably about 2.0 degrees. In this way, a range of adjustment angles (e.g., +/- 2 degrees) may be accommodated.

[0023] In accordance with alternative embodiment of the present invention, leg portion 104 includes a horizontal section 502 providing an offset between boss 106 (and hence shaft 105) and leg portion 104 (Fig. 5). That is, shaft 105 need not lie on the same plane as leg portion 104. Although this configuration may not conceal the entirety of leg portion 104 (i.e., the back edge of leg portion 104 may be exposed after certain ranges of adjustments), it nevertheless results in a substantially concealed leading edge 404. To the extent that disclosure of leading edge 404 of leg portion 104 during address is more disruptive, visually, than disclosure of the back edge, this embodiment is desirable in cases where an offset between boss 106 and leg portion 104 is desired.

[0024] Although the invention has been described herein in conjunction with the appended drawings, those skilled in the art will appreciate that the scope of the invention is not so limited. Modifications in the selection, design, and arrangement of the various components

and steps discussed herein may be made without departing from the scope of the invention as set forth in the appended claims.